

IN THE CLAIMS:

The following is a complete list of the claims now pending. This listing replaces all earlier versions and listings of the claims.

Claims 1-3 (canceled)

Claim ²/~~4~~ (currently amended): A light-scanning optical apparatus according to claim ~~[[2]] 17~~, wherein the requirement of conditional formula ~~below (3)~~ is satisfied:

$$0.86 < N1 / N2 < 0.92 \quad (3).$$

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Claim ³/~~5~~ (currently amended): A light-scanning optical apparatus according to claim ~~[[2]] 17~~, wherein the requirement of ~~[[the]]~~ conditional formula ~~below (4)~~ is satisfied:

$$0.05 < D0 / F < 0.08 \text{ , and} \quad (4),$$

~~where~~ wherein ~~D0~~ ~~[[:]]~~ is the distance between the deflection plane of the optical deflector and the spherical lens.

Claim ⁴/~~6~~ (currently amended): A light-scanning optical apparatus according to claim ~~[[2]] 17~~, wherein the requirement of ~~[[the]]~~ conditional formula ~~below (5)~~ is satisfied:

$$0.15 < \frac{(D1 / N1 + D2 + D3 / N2)}{F} < 0.20 \text{ , and} \quad (5),$$

where wherein D1[[:]] is the thickness of the spherical lens, D2[[:]] is the distance between the spherical lens and the first cylindrical lens, and D3[[:]] is the thickness of the first cylindrical lens.

Claims 7-9 (canceled)

Claim 10⁵ (currently amended): A light-scanning optical apparatus according to

claim 10⁵ 1/7, wherein:

said focusing optical system showing power in the subscanning sub-scanning direction has a second cylindrical lens; and

the light beam ~~at image height = 0~~ is made to pass through a position off the optical axis of the second cylindrical lens in the sub-scanning section when the image height is equal to zero (0).

Claim 11⁶ (currently amended): A light-scanning optical apparatus according to claim 10⁵, wherein [[the]] a direction vector of the light beam reflected by the deflection plane at image height = 0 and the optical axis of the second cylindrical lens are made to show a predetermined angle.

Claim ⁷1/2 (original): A light-scanning optical apparatus according to claim ⁵1/0,

wherein the perpendicular to the deflection plane at image height = 0, the optical axis of the spherical lens and that of the first cylindrical lens are parallel with each other in the sub-scanning section.

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Claim ⁸1/3 (currently amended): A light-scanning optical apparatus according to claim ⁵1/0, wherein:

the perpendicular to the deflection plane at image height=0 and the optical axis of the first cylindrical lens are parallel with each other in the sub-scanning section; and[[,]]

if [[the]] a direction vector of the light beam entering the deflection plane at image height = 0 and [[the]] a direction vector of the light beam reflected by the deflection plane are expressed respectively by $\alpha 1$ and $\alpha 2$ and [[the]] a direction vector of the optical axis of the spherical lens is expressed by β , the requirement of the following conditional formula ~~below~~ is satisfied[[:]],

$$|\alpha 1 \cdot \beta| > |\alpha 2 \cdot \beta|.$$

Claim ⁹1/4 (original): A light-scanning optical apparatus according to claim ⁵1/0,

wherein the light beam reflected by the deflection plane at image height = 0, the optical axis of the spherical lens and that of the first cylindrical lens are parallel with each other in the sub-scanning section.

¹⁰
Claim 1~~6~~ (original): A light-scanning optical apparatus according to claim ⁵1~~6~~,

wherein the light beam emitted from the light source strikes the deflection plane of the optical deflector with a width broader than that of the deflection plane in the main-scanning direction.

¹¹
Claim 1~~6~~ (original): A light-scanning optical apparatus according to claim ⁵1~~6~~,

wherein the light beam emitted from the light source strikes the deflection plane of the optical deflector substantially along the center line of the deflection angle of the optical deflector.

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Claim 1~~7~~ (currently amended): A light-scanning optical apparatus comprising:

an optical deflector;

an incidence optical system adapted to cause a light beam emitted from a light source to strike a deflection plane of [[an]] said optical deflector with a predetermined angle in [[the]] a sub-scanning section; and

a focussing focusing optical system for focussing focusing the light beam reflected by the deflection plane of the optical deflector on a surface to be scanned[[]],

wherein said focussing focusing optical system including includes an fθ lens system having a spherical lens and a first cylindrical lens showing power in the main-scanning direction and an optical system showing power in the sub-scanning direction[[]],

wherein said focussing focusing optical system satisfying satisfies the requirements of conditional formulas (1) and (2) below:

$$\left| \frac{(N1 - 1)}{R2} \cdot F \right| < 0.15 \quad (1)$$

and

$$\left| \frac{(N2 - 1)}{R3} \cdot F \right| < 0.15; \text{ and} \quad (2)$$

where wherein F is the focal length of the f0 lens system in the main-scanning direction, R2 is the radius of curvature of the surface of the spherical lens facing the surface to be scanned, R3 is the radius of curvature of the surface of the first cylindrical lens facing the optical deflector as viewed in the main-scanning direction, N1 is the refractive index of the material of the spherical lens at the operating wavelength, and N2 is the refractive index of the material of the first cylindrical lens at the operating wavelength.

F: ~~the focal length of the f0 lens system in the main-scanning direction;~~

R2: ~~the radius of curvature of the surface of the spherical lens facing the surface to be scanned;~~

R3: ~~the radius of curvature of the surface of the first cylindrical lens facing the optical deflector as viewed in the main-scanning direction;~~

N1: ~~the refractive index of the material of the spherical lens at the operating wavelength and~~

N2: ~~the refractive index of the material of the first cylindrical lens at the operating wavelength;~~

¹² 18 (original): A light-scanning optical apparatus according to claim ¹17,
wherein the left side of the conditional formula (1) and the left side of the conditional formula (2)
satisfy the requirement

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$$\left| \frac{(N1 - 1)}{R2} \cdot F \right| < \left| \frac{(N2 - 1)}{R3} \cdot F \right|$$

¹³ Claim ¹19 (original): A light-scanning optical apparatus according to claim ¹17,
wherein the light beam emitted from the light source strikes the deflection plane of the optical
deflector with a width broader than that of the deflection plane in the main-scanning direction.

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¹⁴ Claim ¹20 (currently amended): A light-scanning optical apparatus according to
claim ¹17, wherein the spherical lens and the first cylindrical lens also constitute
part of said incidence optical system.

¹⁵ Claim ¹21 (original): A light-scanning optical apparatus according to claim ¹17,
wherein the light beam emitted from the light source strikes the deflection plane of the optical
deflector substantially along the center line of the deflection angle of the optical deflector.

¹⁶ Claim ¹22 (currently amended): A light-scanning optical apparatus according to
claim ¹17, wherein said focusing optical system showing power in the sub-scanning direction has
a second cylindrical lens showing power in the sub-scanning direction.

[Claims 23-28 (canceled)]

¹⁷
Claim 29 (currently amended): ~~An image forming~~ A light-scanning apparatus
comprising according to claim 1 ~~1~~ further comprising:

~~a light-scanning optical apparatus according to any of claims 1 through~~
28;

~~a photosensitive member arranged on said~~ defining at least in part
the surface to be scanned whereby the light beam focused on said photosensitive member by said
focusing optical system creates an electrostatic latent image;

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~~a developing unit for developing [[an]]~~ the electrostatic latent image
formed on said photosensitive member ~~by a light beam caused to scan by said light-scanning~~
~~optical apparatus~~ into a toner image;

~~a transfer unit for transferring [[said]]~~ the developed toner image onto a
toner image receiving member; and

~~a fixing unit for fixing the transferred toner image on the toner image~~
receiving member.

¹⁸
Claim 30 (currently amended): ~~An image forming~~ A light-scanning apparatus
comprising according to claim 1 ~~1~~ further comprising~~[[:]]~~

~~a light-scanning optical apparatus according to any of claims 1 through~~
28; and

a printer controller for transforming code data input from an external device into an image signal and ~~input it~~ inputting the image signal into said light-scanning optical apparatus.

[Claims 31-46 (canceled)]

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Claim ¹⁹47 (new): A light-scanning optical apparatus comprising:

a optical deflector;

an incidence optical system adapted to cause a light beam emitted from a light source to strike a deflection plane of the optical deflector with a predetermined angle in a sub-scanning section; and

a focusing optical system for focusing the light beam reflected by the deflection plane of the optical deflector on a surface to be scanned,

wherein said focusing optical system includes an fθ lens system having a first lens showing power in the main scanning direction and a second lens showing power in the main scanning direction and an optical system showing power in the sub-scanning direction;

wherein said focusing optical system satisfies the requirements of conditional formulas

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$$\left| \frac{(N1 - 1)}{R2} \cdot F \right| < 0.15$$

and

$$\left| \frac{(N2 - 1)}{R3} \cdot F \right| < 0.15, \text{ and}$$

wherein F is the focal length of the f θ lens system in the main-scanning direction, R2 is the radius of curvature in the main scanning direction of the surface of the first lens facing the surface to be scanned, R3 is the radius of curvature of the surface in the main scanning direction of the surface of the second lens facing said optical deflector as viewed in the main-scanning direction, N1 is the refractive index of the material of the first lens at the operating wavelength, and N2 is the refractive index of the material of the second lens at the operating wavelength.

²⁰ Claim 48 (new): A light-scanning optical apparatus according to claim ¹⁹47,

wherein said apparatus satisfies the requirement of

$$\left| \frac{(N2-1)}{R3} \cdot F \right| < \left| \frac{N1-1}{R2} \cdot F \right|.$$

²¹ Claim 49 (new): A light-scanning optical apparatus according to claim ¹⁹47,

wherein the light beam emitted from the light source strikes the deflection plane of the optical deflector with a width broader than that of the deflection plane in the main-scanning direction.

²² Claim 50 (new): A light-scanning optical apparatus according to claim ¹⁹47,

wherein the first lens and the second lens also constitute part of said incidence optical system.

²³
Claim 51 (new): A light-scanning optical apparatus according to claim ¹⁹47,
wherein the light beam emitted from the light source strikes the deflection plane of the optical
deflector substantially along the center line of the deflection angle of the optical deflector.

²⁴
Claim 52 (new): A light-scanning optical apparatus according to claim ¹⁹47,
wherein said focusing optical system showing power in the sub-scanning direction has a
cylindrical lens showing power in the sub-scanning direction.

²⁵
Claim 53 (new): A light-scanning optical apparatus according to claim ¹⁹47,
wherein said apparatus satisfies the requirement of conditional formula

$$0.86 < N1/N2 < 0.92 .$$

²⁶
Claim 54 (new): A light-scanning optical apparatus according to claim ¹⁹47,
wherein said apparatus satisfies the requirement of conditional formula

$$0.05 < D0 / F < 0.08, \text{ and}$$

wherein D0 is the distance between the deflection plane of the optical
deflector and the first lens.

²⁷
Claim 55 (new): A light-scanning optical apparatus according to claim ¹⁹47,
wherein the first lens comprises a spherical lens and the second lens
comprises a cylindrical lens; and

wherein the requirement of the following conditional formula is satisfied

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$$0.15 < \frac{(D1 / N1 + D2 + D3 / N2)}{F} < 0.20, \text{ and}$$

wherein D1 is the thickness of the spherical lens, D2 is the distance between the spherical lens and the cylindrical lens, and D3 is the thickness of the cylindrical lens.

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Claim 56 (new): A light-scanning optical apparatus according to claim 47,

wherein:

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said focusing optical system showing power in the sub-scanning direction has a cylindrical lens; and

the light beam at image height = 0 is made to pass through a position off the optical axis of the cylindrical lens in the sub-scanning section.

29
Claim 57 (new): A light-scanning optical apparatus according to claim 56,

wherein a direction vector of the light beam reflected by the deflection plane at image height=0 and the optical axis of the cylindrical lens are made to show a predetermined angle.

30
Claim 58 (new): A light-scanning optical apparatus according to claim 56,

wherein the perpendicular to the deflection plane at image height = 0, the optical axis of the first lens and that of the second lens are parallel with each other in the sub-scanning section.

³¹
Claim ~~59~~ (new): A light-scanning optical apparatus according to claim ~~56~~,²⁸

wherein:

the perpendicular to the deflection plane at image height=0 and the optical axis of the second lens are parallel with each other in the sub-scanning section; and

if a direction vector of the light beam entering the deflection plane at image height=0 and a direction vector of the light beam reflected by the deflection plane are expressed respectively by $\alpha 1$ and $\alpha 2$ and a direction vector of the optical axis of the first lens is expressed by β , requirement of the following conditional formula is satisfied

$$|\alpha 1 \cdot \beta| > |\alpha 2 \cdot \beta|.$$

³²
Claim ~~60~~ (new): A light-scanning optical apparatus according to claim ~~56~~,²⁸

wherein the light beam reflected by the deflection plane at image height = 0, the optical axis of the first lens and that of the second lens are parallel with each other in the sub-scanning section.

³³
Claim ~~61~~ (new): A light-scanning optical apparatus according to claim ~~47~~,¹⁹

further comprising:

a photosensitive member arranged on the surface to be scanned;

a developing unit for developing an electrostatic latent image formed on said photosensitive member by a light beam focused on said photosensitive member by said focusing optical system into a toner image;

a transfer unit for transferring the developed toner image onto a toner image receiving member; and

a fixing unit for fixing the transferred toner image on the toner image
receiving member.

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³⁴/₁ Claim 62 (new): A light-scanning optical apparatus according to claim ¹⁹/₁ 47

further comprising a printer controller for transforming code data input from an external device
into an image signal and inputting the image signal into said light-scanning optical apparatus.
